

I. AMENDMENTS TO THE CLAIMS:

Kindly amend claims 2, 3, 11-19, 23, 24, 26-28, 47-54, 56, and 58-60 as follows.

The following claims will replace all prior versions of claims in the above-captioned application.

Listing of Claims:

1. (Cancelled)
2. (Currently Amended) An isolated DNA molecule comprising a nucleotide sequence that encodes ~~a biologically active a~~ protamine polypeptide ~~or functional fragment thereof~~, wherein the nucleotide sequence is as set out in SEQ ID NO. 32.
3. (Currently Amended) An isolated DNA molecule providing an expression cassette capable of directing the expression of a ~~biologically active-protamine polypeptide or functional fragment thereof~~ in a suitable host, wherein said expression cassette comprises from 5' to 3':
 - (a) a promoter capable of expressing a downstream coding sequence in a suitable host;
 - (b) a DNA sequence coding for the expression of ~~a biologically active the~~ protamine polypeptide ~~or functional fragment thereof~~; and
 - (c) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32.
4. (Cancelled)

5. (Previously Presented) Isolated DNA molecule according to claim 2, wherein the coding nucleotide sequence is a cDNA, genomic or manufactured DNA sequence.

6. (Previously Presented) Isolated DNA molecule according to claim 3, wherein the coding nucleotide sequence is fused with a suitable signal peptide encoding sequence.

7. (Previously Presented) Isolated DNA molecule according to claim 3, wherein the promoter, or the coding nucleotide sequence, or the promoter and the coding nucleotide sequence, are selected to ensure expression in an eucaryotic host.

8. (Previously Presented) Isolated DNA molecule according to claim 3, wherein the promoter, or the coding nucleotide sequence, or the promoter and the coding nucleic acid sequence, are selected to ensure expression in a procaryotic host.

9. (Previously Presented) Isolated DNA molecule according to claim 7, wherein the promoter is an inducible promoter.

10. (Previously Presented) A plasmid or vector system comprising one or more DNA molecules according to claim 2.

11. (Currently Amended) A procaryotic or eucaryotic host cell, seed, tissue or whole organism transformed or transfected with the DNA molecule according to claim 3 in a manner enabling said host cell, seed, tissue or whole organism to express a-protamine polypeptide or functional fragment thereof.

12. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 11 selected from the group consisting of bacteria, fungi including yeast, insect, animal and plant cells, seeds, tissues, whole animal organisms and whole plant organisms.

13. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 12 that is a procaryotic host cell or whole organism, wherein the procaryotic host cell or whole organism is a bacterium selected from the group consisting of proteobacteria including members of the alpha, beta, gamma, delta and epsilon subdivision, gram-positive bacteria including Actinomycetes, Firmicutes, Clostridium and relatives, flavobacteria, cyanobacteria, green sulfur bacteria, green non-sulfur bacteria, and archaea.

14. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 13, wherein the procaryotic host cell or whole organism belongs to the group of proteobacteria selected from the group consisting of *Agrobacterium*, *Rhodospirillum*, *Rhodopseudomonas*, *Rhodobacter*, *Rhodomicrobium*, *Rhodopila*, *Rhizobium*, *Nitrobacter*, *Aquaspirillum*, *Hyphomicrobium*, *Acetobacter*, *Beijerinckia*, *Paracoccus*, *Pseudomonas*, ammonia-oxidizing bacteria including *Nitrosomonas*, *Enterobacteriaceae*, and *Myxobacteria* including *Myxococcus*.

15. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 13, wherein the procaryotic host cell or whole organism belongs to the group of gram-positive bacteria selected from the group consisting of Actinomycetes and Firmicutes including Clostridium and relatives including Bacillus and Lactococcus.

16. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 13, wherein the procaryotic host cell or whole organism belongs to the group of flavobacteria selected from the group consisting of Bacteroides, Cytophaga and Flavobacterium.

17. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 13, wherein the procaryotic host cell or whole organism belongs to the group of cyanobacteria selected from the group consisting of Chlorococcales including Synechocystis and Synechococcus.

18. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 13, wherein the procaryotic host cell ~~or whole organism~~ belongs to the groups of green sulfur bacteria or green non-sulfur bacteria selected from the group consisting of Chlorobium and Chloroflexaceae including Chloroflexus.

19. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 13, wherein the procaryotic host cell ~~or whole organism~~ belongs to the group of archaea selected from Halobacteriaceae including Halobacterium.

20. (Previously Presented) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 12 that is an eucaryotic host cell or whole organism that is a fungi including yeast selected from the group consisting of Ascomycota including Saccharomycetes including Pichia and Saccharomyces, and anamorphic Ascomycota including Aspergillus.

21. (Previously Presented) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 12 that is an eucaryotic host cell that is an insect cell selected from the group consisting of SF9, SF21, Trychplusiani and MB21.

22. (Previously Presented) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 12 that is an eucaryotic host cell that is an animal cell selected from the group consisting of Baby Hamster Kidney (BHK) cells, Chinese Hamster Ovarian (CHO) cells, Human Embryonic Kidney (HEK) cells and COS cells.

23. (Currently Amended) The prokaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 12 that is ~~an~~ eucaryotic host cell that is a plant cell, seed, tissue or whole organism selected from the group consisting of eukaryotic alga, embryophytes comprising *Bryophyta*, *Pteridophyta* and *Spermatophyta* including *Gymnospermae* and *Angiospermae*, wherein *Angiospermae* include *Magnoliopsida*, *Rosopsida*, and *Liliopsida*.

24. (Currently Amended) A method of transforming or transfecting a procaryotic or eucaryotic host cell, seed, tissue or whole organism with a DNA molecule in a manner enabling said host cell, seed, tissue or whole organism to express a protamine polypeptide or functional fragment thereof, wherein the DNA molecule provides an expression cassette capable of directing the expression of the biologically active protamine polypeptide or functional fragment thereof in the host cell, wherein said expression cassette comprises from 5' to 3'

(a) a promoter capable of expressing a downstream coding sequence in a suitable host;

(b) a DNA sequence coding for the expression of a biologically active the protamine polypeptide or functional fragment thereof; and

(c) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide or functional fragment thereof, the method comprising the stepsstep of:

(i) providing the procaryotic or eucaryotic host cell, seed, tissue or whole organism; ~~organism~~² and

(ii) performing a transformation or transfection of said host cell, seed, tissue or whole organism with the DNA molecule according claim 3.

25. (Previously Presented) A transformed or transfected host cell, seed, tissue or whole organism represented by or regenerated from transformants or transfectants yielded according to claim 24.

26. (Currently Amended) Method for the production of a ~~biologically active~~ protamine polypeptide ~~or functional fragment thereof~~, comprising the steps of:

(a) culturing a transformed or transfected host cell, seed, tissue or whole organism represented by or regenerated from transformants or transfectants in culture medium under suitable conditions allowing production of said polypeptide ~~or functional fragment within~~ said host; and, optionally,

(b) isolating said polypeptide ~~or functional fragment~~ from said host or from the culture medium, wherein the transformants or transfectants are yielded by transforming or transfecting a procaryotic or eucaryotic host cell, seed, tissue or whole organism with a DNA molecule in a manner enabling said host cell, seed, tissue or whole organism to express said protamine polypeptide ~~or functional fragment thereof~~, wherein the DNA molecule provides an expression cassette capable of directing the expression of the ~~biologically active~~ protamine polypeptide ~~or functional fragment thereof~~ in the host cell, wherein said expression cassette comprises from 5' to 3'

(i) a promoter capable of expressing a downstream coding sequence in a suitable host;

(ii) a DNA sequence coding for the expression of said ~~biologically active~~
~~protamine polypeptide or functional fragment thereof~~; and

(iii) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ
ID NO. 32, in order to yield transformants or transfectants capable of expressing the
~~protamine polypeptide or functional fragment thereof~~, wherein the transformants are yielded
by

(1) providing the prokaryotic or eucaryotic host cell, seed, tissue or whole
organism; and

(2) performing a transformation or transfection of said host cell, seed, tissue or
whole organism with the DNA molecule according claim 3.

27. (Currently Amended) Method according to claim 26, wherein said
transformed or transfected host cell is selected from prokaryotes, and wherein said
~~polypeptide or functional fragment~~ is isolated after induction of a log phase culture with a
suitable inducing agent.

28. (Currently Amended) Method according to claim 27, wherein said
~~polypeptide or functional fragment~~ is isolated until said host cell re-enters log phase.

Claims 29-43 have been cancelled.

44. (Withdrawn and Currently Amended) A procaryotic or eucaryotic host cell,
seed, tissue or whole organism transformed or transfected with the plasmid or vector system

according to claim 10 in a manner enabling said host cell, seed, tissue or whole organism to express thea protamine polypeptide ~~or functional fragment thereof~~.

45. (Cancelled)

46. (Cancelled)

47. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 14, wherein the procaryotic host cell ~~or whole organism~~ belongs to the group of proteobacteria selected from the group consisting of Rhodopseudomonas, Pseudomonas and Escherichia.

48. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 47, wherein the procaryotic host cell ~~or whole organism~~ belongs to the group of proteobacteria selected from the group consisting of Rhodopseudomonas palustris, Pseudomonas fluorescens, and Escherichia coli.

49. (Currently Amended) The prokaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 15, wherein the procaryotic host cell ~~or whole organism~~ belongs to the group of gram-positive bacteria selected from the group consisting of Bacillus subtilis and Lactococcus lactis.

50. (Currently Amended) The prokaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 16, wherein the procaryotic host cell ~~or whole organism~~

belongs to the group of flavobacteria selected from the group consisting of Flavobacterium including Flavobacterium ATCC21588.

51. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 17, wherein the procaryotic host cell ~~or whole organism~~ belongs to the group of cyanobacteria selected from the group consisting of Synechocystis sp. and Synechococcus sp. PS717.

52. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 18, wherein the procaryotic host cell ~~or whole organism~~ belongs to the groups of green sulfur bacteria or green non-sulfur bacteria selected from the group consisting of Chlorobium limicola f. thiosulfatophilum and Chloroflexus aurantiacus.

53. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 19, wherein the procaryotic host cell ~~or whole organism~~ belongs are Halobacterium salinarum.

54. (Currently Amended) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 20, wherein the eucaryotic host cell ~~or whole organism~~ that is selected from the group consisting of Saccharomyces cerevisiae and Aspergillus niger.

55. (Previously Presented) The procaryotic or eucaryotic host cell, seed, tissue or whole organism according to claim 22, wherein the eucaryotic host cell is an animal cell selected from the group consisting of NIH 3T3 and 293 cells.

56. (Currently Amended) A method of transforming or transfecting a prokaryotic or eucaryotic host cell, seed, tissue or whole organism transformed or transfected with a DNA molecule in a manner enabling said host cell, seed, tissue or whole organism to express a protamine polypeptide or functional fragment thereof, wherein the DNA molecule provides an expression cassette capable of directing the expression of the biologically active protamine polypeptide or functional fragment thereof in the host cell, wherein said expression cassette comprises from 5' to 3'

(a) a promoter capable of expressing a downstream coding sequence in a suitable host;

(b) a DNA sequence coding for the expression of ~~the~~ a biologically active protamine polypeptide or functional fragment thereof; and

(c) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide or functional fragment thereof, the method comprising the ~~steps~~ step of:

(i) providing the prokaryotic or eucaryotic host cell, seed, tissue or whole organism; and

(ii) performing a transformation or transfection of said host cell, seed, tissue or whole organism with the plasmid or vector system according to claim 10.

57. (Previously Presented) A transformed or transfected host cell, seed, tissue or whole organism represented by or regenerated from transformants or transfectants yielded according to claim 56.

58. (Currently Amended) Method for the production of a biologically active protamine polypeptide or functional fragment thereof, comprising the steps of:

(a) culturing a transformed or transfected host cell, seed, tissue or whole organism represented by or regenerated from transformants or transfectants in culture medium under suitable conditions allowing production of said polypeptide or functional fragment within said host; and, optionally,

(b) isolating said polypeptide or functional fragment from said host or from the culture medium, wherein the transformants or transfectants are yielded by transforming or transfecting a procaryotic or eucaryotic host cell, seed, tissue or whole organism with a DNA molecule in a manner enabling said host cell, seed, tissue or whole organism to express said protamine polypeptide or functional fragment thereof, wherein the DNA molecule provides an expression cassette capable of directing the expression of the biologically active protamine polypeptide or functional fragment thereof in the host cell, wherein said expression cassette comprises from 5' to 3'

(i) a promoter capable of expressing a downstream coding sequence in a suitable host;

(ii) a DNA sequence coding for the expression of said biologically active protamine polypeptide or functional fragment thereof; and

(iii) a 3' termination sequence, wherein the DNA sequence (b) is as set out in SEQ ID NO. 32, in order to yield transformants or transfectants capable of expressing the protamine polypeptide or functional fragment thereof, wherein the transformants are yielded by

(1) providing the prokaryotic or eucaryotic host cell, seed, tissue or whole organism; and

(2) performing a transformation or transfection of said host cell, seed, tissue or whole organism with the plasmid or vector system according to claim 10.

59. (Currently Amended) Method according to claim 58, wherein said transformed or transfected host cell is selected from prokaryotes, and wherein said polypeptide or functional fragment is isolated after induction of a log phase culture with a suitable inducing agent.

60. (Currently Amended) Method according to claim 59, wherein said polypeptide or functional fragment is isolated until said host cell re-enters log phase.

61. (Previously Presented) Method according to claim 59, wherein said transformed or transfected host cell is selected from the group consisting of *Rhodopseudomonas palustris*, *Pseudomonas fluorescens*, and *Escherichia coli*.

62. (Previously Presented) Method according to claim 27, wherein said transformed or transfected host cell is selected from the group consisting of *Rhodopseudomonas palustris*, *Pseudomonas fluorescens*, and *Escherichia coli*.